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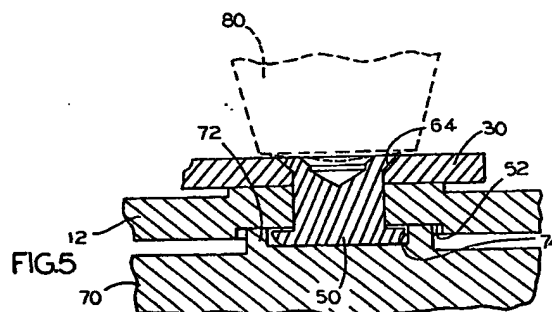
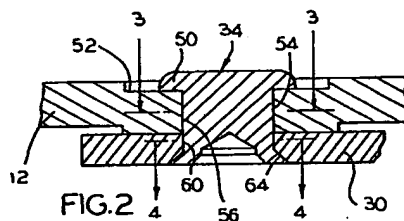
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(54) A window hinge and method of assembly thereof

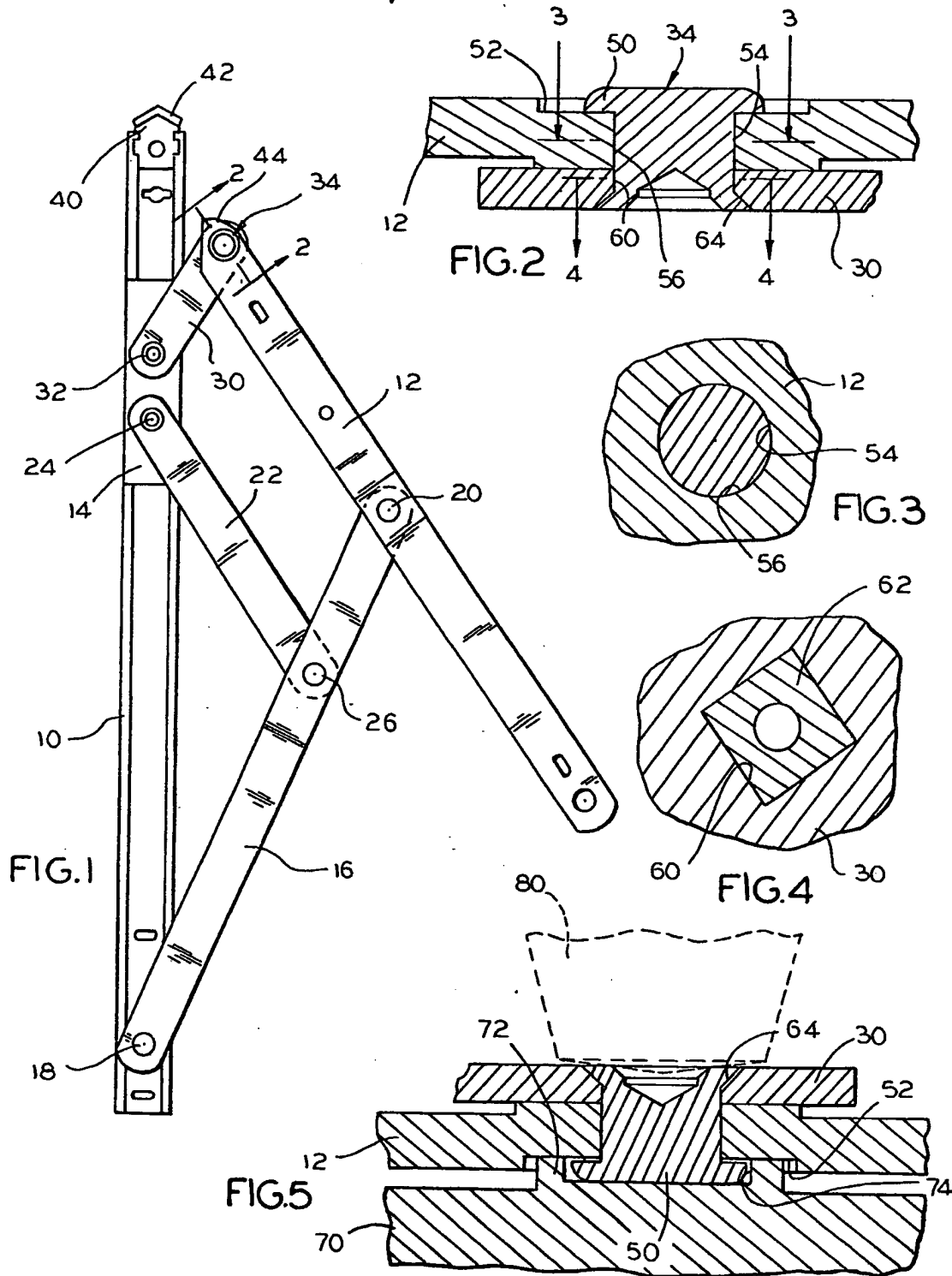
(57) A window hinge having a plurality of members including a track, a sash arm 12, and a link 30, has a pivot connection between a pair of the members defined by a rivet 34 having a cylindrical shank 54 with a part thereof loosely mounted within a round hole 56 of one member 12 and a tubular part of the shank being deformed into a nonround hole 60 in the other member and with an end of the shank flared outwardly into a countersink 64 surrounding the end of the nonround hole for locking of the rivet to the latter member. The components are assembled with a controlled clearance between the members to facilitate pivoting of one member relative to the other and without the use of any spacer member.

A method of making such a window hinge utilizes a riveting post 72 which holds the members in a fixed position and reacts to the force applied by a riveting tool 80 and with the window hinge member adjacent the underside of the rivet head being held at a distance therefrom to achieve the controlled clearance (see Figure 5).



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## SPECIFICATION

### A window hinge and method of assembly thereof

#### 5 Background of the invention

This invention pertains to a window hinge having a plurality of members including a track, a sash arm and a link. Rivet means defines a pivotal connection  
10 between a pair of the members and is associated therewith in a manner to provide a sturdy long-wearing pivotal connection and with a controlled clearance between a head of the rivet and the members without the use of any additional  
15 spacing member. The window hinge is assembled by a method utilizing a special riveting post which establishes a clearance between the underside of the rivet head and an adjacent one of the members and reacts to the deforming force applied to the rivet to  
20 maintain the clearance after final assembly to enable free pivoting movement of one member relative to the other.

Window hinges for pivotally mounting a casement window or a window that can pivot in or out are well  
25 known in the art. Generally, these window hinges have a track mountable to a window frame and a sash arm mountable to a window sash. A shoe is slidable along the track and the sash arm is pivotally connected to the track and to one or more links which  
30 are pivotally connected to the shoe.

A common expedient for making the pivotal interconnection is by use of a rivet extending through openings in the two members that are to be pivotally interconnected. In assembly of the window  
35 hinge, an end of the rivet is deformed by a riveting tool to hold the components in assembled relation and a spacer is interfitted between the members to provide for free pivoting movement relative to each other. It is also known in the art to have one of the  
40 members formed with a nonround hole through which the shank of the tubular rivet extends and with one end of the hole formed with a recess to receive the deformed tail of the rivet.

The prior art has not disclosed a window hinge  
45 having a pivotal connection between a pair of members provided by a rivet having a partially tubular shank which extends through a round hole in one member and which is deformed into a nonround hole in the other member and a countersink at one  
50 end thereof, and with there being a controlled clearance between the members and the head of the rivet without the use of any spacing member. A method of assembling such a window hinge similarly is not shown in the prior art.

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#### Summary of the invention

A primary feature of the invention is to provide a new and improved window hinge and method of assembly thereof.

60 The window hinge has a plurality of members including a track, a sash arm and a link, with a pivotal connection between a pair of the members being defined by a rivet associated therewith to provide a controlled clearance between the components  
65 without the use of any special spacing member. One

of the members has a nonround hole and the other member has a round hole with the shank of the rivet extending through said holes and a portion of the rivet shank being tubular and deformed into

70 interlocking relation with the nonround hole and into a countersink surrounding the nonround hole. The round hole in the other of the pair of members pivotally receives a portion of the rivet shank, with the head of the rivet holding the members in  
75 association and the part of the rivet shank which mounts the member having the round hole having a length greater than the length of said hole to provide a controlled clearance, without the use of any spacing member to facilitate pivoting of one  
80 member relative to the other.

An object of the invention is to provide a window hinge having a plurality of members and means defining a pivotal connection between a pair of said members comprising, a square hole through one of  
85 said pair of members and having a countersink surrounding said hole on one side of said one member, a round hole in the other of said pair of members, a rivet with the head adjacent the other of said pair of members and having a shank extending  
90 through said round hole, said shank having a tubular part in said square hole and deformed to closely fit in the square hole and with an end of the shank deformed into said countersink to hold the rivet and members in pivotally assembled relation and with  
95 the shank end not raised above the surface of said one member, and a controlled clearance between said rivet head and said other member to assure pivotal freedom of said pair of members relative to each other.

100 Still another object of the invention is to provide a method of assembling a window hinge having a pair of pivotally interconnected members wherein one member has a square hole and a countersink at one end of the hole and the other member has a round  
105 hole, the connection being made by means of a rivet having a head and a cylindrical shank which has a tubular part remote from the head and with a clearance between the rivet head and said other member comprising: placing the rivet head within a  
110 recess defined by a raised surface of a riveting post with the recess having a depth greater than the thickness of the head; positioning the other member against the raised surface wall with the shank of the rivet in said round hole; placing said one member  
115 against the other member with the tubular part of the rivet shank in the square hole and with the countersink at the exposed face of said one member; and deforming the tubular part of the rivet outwardly to closely fit in said square hole and the countersink  
120 with said raised surface reacting to the force applied to deform the tubular part of the rivet to achieve said clearance between the rivet head and said other member.

#### 125 Brief description of the drawings

Figure 1 is an elevational view of a window hinge shown in a partially-open position;

Figure 2 is a sectional view, on an enlarged scale, taken generally along the line 2-2 in Figure 1;

130 Figure 3 is a fragmentary sectional view, taken

generally along the line 3-3 in Figure 2;

Figure 4 is a fragmentary sectional view, taken generally along the line 4-4 in Figure 2; and

Figure 5 is a sectional view of the components 5 shown in Figure 2 and in inverted position in association with structure used in assembling the window hinge.

#### *Description of the preferred embodiment*

10 The window hinge illustrated in the drawings is of the type generally known as a 6-bar hinge and has a track 10 mountable to a window frame and a sash arm 12 mountable to a window sash. As is known in commercially-available window hinges of this type, 15 there is a shoe 14 slidable along the track 10 and a series of links which movably mount the sash arm relative to the track and shoe. These links include a first link 16 having its ends pivotally connected at 18 to the track 10 and pivotally connected at 20 to the sash arm 12. A second link 22 has its ends pivotally 20 connected to the shoe at 24 and to the first link 16 intermediate its ends at 26. A third link 30 is pivotally connected at its ends to the shoe at 32 and to the sash arm 12 at 34.

25 An end of the track 10 has a cap 40 mechanically locked thereto, with a V-shaped cam member 42 which coacts with a generally V-shaped cam end 44 on the sash arm 12.

The window hinge components are shown 30 positioned in Figure 1 in the position they would assume when the window mounted thereby is in a partially-open position. The window can be opened further with the shoe 14 moving toward the lower end of the track 10 as viewed in Figure 1. In closing of 35 the window, the shoe 14 moves upwardly along the track 10, as viewed in Figure 1, with the sash arm 12 and the links moving into positions generally aligned with the track 10 and with secure closing of the window being achieved by coaction of the cam end 40 44 of the sash arm with the cam member 42 mounted at the end of the track.

The pivotal connection 34 between the sash arm 12 and the third link 30 is shown particularly in Figures 2-4. The pivotal connection is achieved by 45 the use of a rivet having a head 50 positioned within a counterbore 52 in the sash arm 12 and a cylindrical shank 54 pivotally received in a round opening 56 in the sash arm 12. A portion of the shank 54 remote from the head 50 is tubular and, in a manner to be 50 subsequently described, is deformed outwardly to tightly interlock with a nonround hole 60 formed in the link 30. The nonround hole 60 can have several different shapes, with the illustrated shape being a square hole and with the deformed section of the 55 rivet shank being identified at 62. The link 30 has a countersink 64 at one end of the hole 60 to receive an outwardly-flared part of the tubular portion of the rivet shank for lengthwise locking of the rivet, as seen in Figure 2. The length of the shank 54 between 60 the underside of the head 50 and the inner surface of the link 30, as viewed in Figure 2, is greater than the depth of the hole 56 in the sash arm 12 whereby there is a controlled clearance to facilitate pivoting of the sash arm 12 relative to the link 30 by rotation of the 65 sash arm on the rivet shank.

The pivotal connections 20, 24, 26 and 32 are of the same construction as the pivotal connection 34, illustrated in Figures 2 to 4.

The method of assembling the window hinge, and 70 particularly the pivotal connection between a pair of members thereof, is illustrated in Figure 5. The method utilizes a riveting post 70 having a raised surface 72 defined by a raised annular wall defining a recess 74 which receives the head 50 of the rivet and 75 with the recess having a depth greater than the thickness of the rivet head. The sash arm counterbore 52 is placed against the raised surface, with the rivet shank within the round hole 56 of the sash arm and the nonround hole 60 of the link 30 80 which is positioned against the sash arm 12. A riveting tool 80, shown in broken line, is forced downwardly to flare out the end of the tubular portion of the rivet shank into the countersink 64 as well as deform the tubular part to closely fit within 85 the square opening 60 in the link 30. The raised surface 72 reacts against the force applied by the riveting tool 80 against the rivet to maintain a controlled clearance between the underside of the rivet head 50 and the surface of the counterbore 52 of 90 the sash arm 12, as seen in Figure 5. This provides for freedom of pivoting of the sash arm 12 relative to the link 30, with rotation about the shank 54 of the rivet and with a portion of the rivet shank being locked into the link 30. The controlled clearance is achieved 95 without the use of any spacing member between the components.

Although the method has been illustrated with respect to the pivotal connection 34, it will be evident that the same method is used for the other pivotal 100 connections which have the same construction as illustrated for pivotal connection 34 in Figures 2-4.

#### CLAIMS

105 1. A window hinge having a plurality of members including a track, a sash arm and a link, and means including a rivet defining a pivotal connection between a pair of said members comprising, a nonround hole through one of said pair of members 110 hold said rivet against rotation and having a countersink surrounding said hole on one side of said one member to receive a deformed portion of the rivet, a round hole in the other of said pair of members pivotally receiving the shank of the rivet, 115 and said rivet having a head adjacent the other of said pair of members and spaced therefrom to provide a controlled clearance therebetween without the presence of a spacing member.

2. A window hinge having a plurality of members 120 including a track, a sash arm and a link, and means defining a pivotal connection between first and second ones of said members comprising, a nonround hole through a first member and having a countersink surrounding said hole on one side 125 thereof, a round hole in the second member, a rivet having a head adjacent the second member and having a shank extending through said round hole, said shank having a tubular part in said nonround hole and deformed to closely fit in the nonround hole 130 and with an end of the shank deformed into said

countersink to hold the rivet and members in pivotally assembled relation, and a controlled clearance between said rivet head and said second member without the presence of any spacing member to assure pivotal freedom of said pair of members relative to each other.

3. A window hinge as defined in claim 2 wherein the tubular part of the rivet is deformed in assembly of the hinge and the length of the shank between the rivet head and said first member is greater than the depth of the round hole in the second member prior to deformation of the tubular end of the rivet and said relation is substantially the same after deformation of the rivet.

4. A window hinge having a plurality of members and means defining a pivotal connection between a pair of said members comprising, a square hole through one of said pair of members and having a countersink surrounding said hole on one side of said one member, a round hole in the other of said pair of members, a rivet with the head adjacent the other of said pair of members and having a shank extending through said round hole, said shank having a tubular part in said square hole and deformed to closely fit in the square hole and with an end of the shank deformed into said countersink to hold the rivet and members in pivotally assembled relation, and a controlled clearance between said rivet head and said other member to assure pivotal freedom of said pair of members relative to each other.

5. The method of assembling a window hinge having pivotally interconnected first and second members wherein the first member has a nonround hole and a countersink at one end of the hole and the second member has a round hole, the pivot connection being achieved by use of a rivet having a head and a cylindrical shank positioned at least in part in the second hole and which has a tubular part remote from the head locked in the nonround hole comprising: placing the rivet head within a recess defined by a raised annular wall of a riveting post with the recess having a depth greater than the thickness of the head, positioning the second member against the raised annular wall with the shank of the rivet in said round hole, placing said first member against the second member with the tubular part of the rivet shank in the nonround hole and with the countersink exposed, and deforming the tubular part of the rivet outwardly to closely fit in said nonround hole and the countersink with said raised annular wall reacting to the force applied to deform the tubular part of the rivet and maintaining a clearance between the underside of the rivet head and said second member.

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**ABSTRACT:**

**A window hinge having a plurality of members including a track, a sash arm 12, and a link 30, has a pivot connection between a pair of the members defined by a rivet 34 having a cylindrical shank 54 with a part thereof loosely mounted**

**within a round hole 56 of one member 12 and a tubular part of the shank being deformed into a nonround hole 60 in the other member and with an end of the shank flared outwardly into a countersink 64 surrounding the end of the nonround hole for locking of the rivet to the latter member. The components are assembled with a controlled clearance between the members to facilitate pivoting of one member relative to the other and without the use of any spacer member.**

**A method of making such a window hinge utilizes a riveting post 72 which holds the members in a fixed position and reacts to the force applied by a riveting tool 80 and with the window hinge member adjacent the underside of the rivet head being held at a distance therefrom to achieve the controlled clearance (see Figure 5). <IMAGE>**